GE Aviation

Evendale Remediation Project Overview

April 2013





O'BRIEN & GERE

Evendale Remediation Project Overview

- **Contents**
  - ***Key Issues***
  - ***Site History***
  - ***RCRA Corrective Action Program (CAP) History, Status and Milestones***
  - ***Summary of Technical Understandings***
  - ***IRM Status***

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Evendale Remediation Project Overview – Key Issues

Operation of groundwater interim remedial measure (IRM)

- Cross-contamination risk - that IRM will draw CVOCs down into lower zones or from offsite sources
- Performance monitoring and evaluation of natural attenuation

Technical approach to site remediation to be developed in CMS Work Plan

- Evaluation of technical impracticability of cleanup to MCLs
- Evaluation of natural attenuation
- Holistic approach to SWMUs/site remediation

Competing regulatory programs, e.g.; management of closed waste oil UST under Bldg 500 through the OEPA BUSTR program

Recent stakeholder settlements: United States Air Force (USAF), Wyoming, Ohio EPA

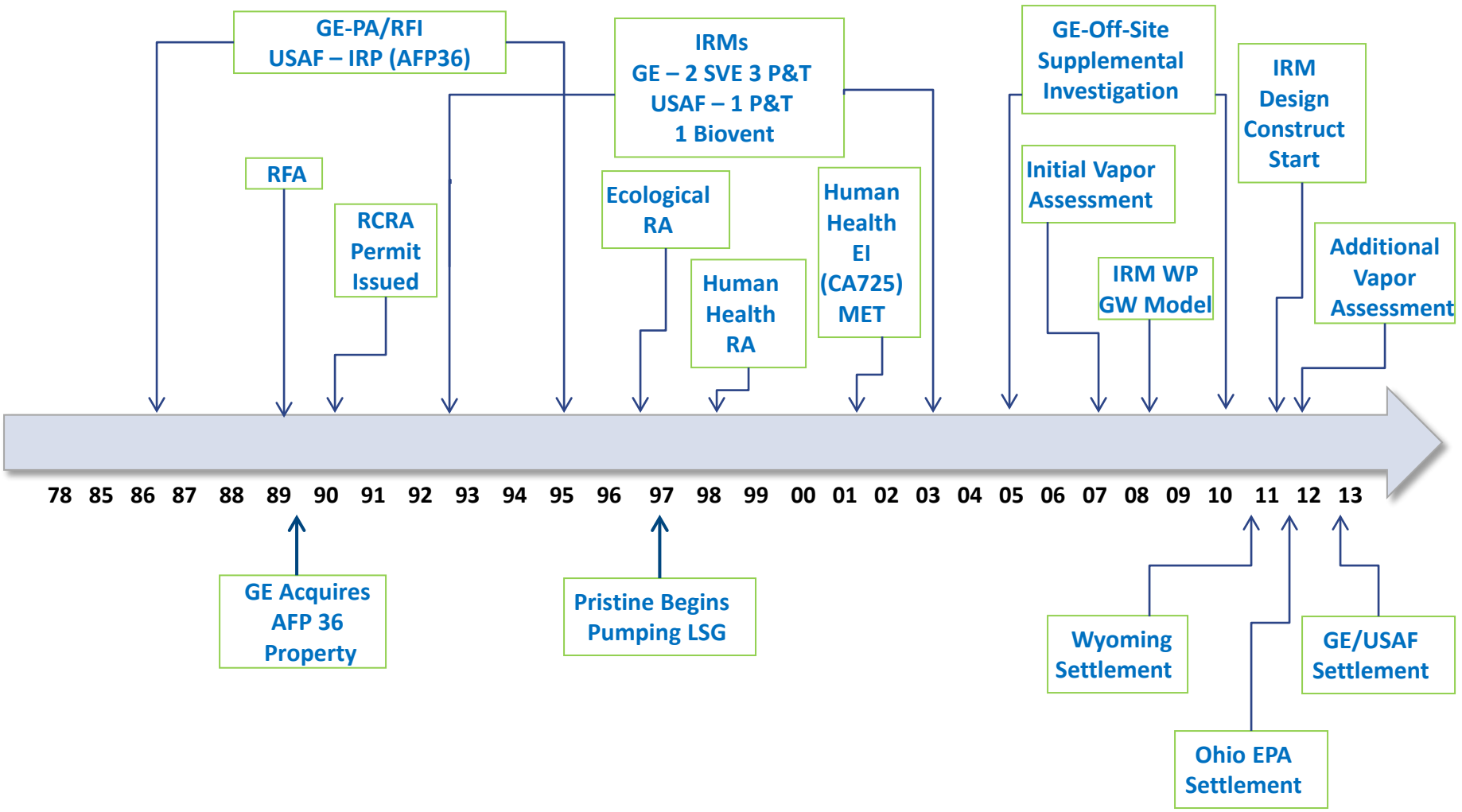
Potential Offsite sources: Pristine, Cincinnati Drum, Dupont Lockland

Consent Order: Potentially at Corrective Measures Implementation (CMI)?

Evendale Remediation Project Overview – Site History

1940 - 1945	Wright Aeronautical manufactures military aircraft engines for USAF
1948	GE begins manufacturing of military aircraft engines for USAF
1940s to 1980s	Dewatering (80-100 ft) of Mill Creek Valley
1960s	GE begins manufacturing commercial aircraft engines
1986 - present	Multiple site investigations and IRMs by GE (under RCRA) and USAF
1989	GE Purchased Ford Motor Warehouse and Air Force Plant 36 (south end)/Completed RFA
1990	RCRA Permit Issued to GE
1997	Pristine Site begins pumping in the Lower Aquifer (LSG)
2010	Settlement of claim by City of Wyoming
2011	Settlement of claim by Ohio EPA
July 2011	Begin groundwater IRM continuous pumping
June 2012	Settlement of claim against USAF

Evendale Remediation Project Overview – RCRA CAP History



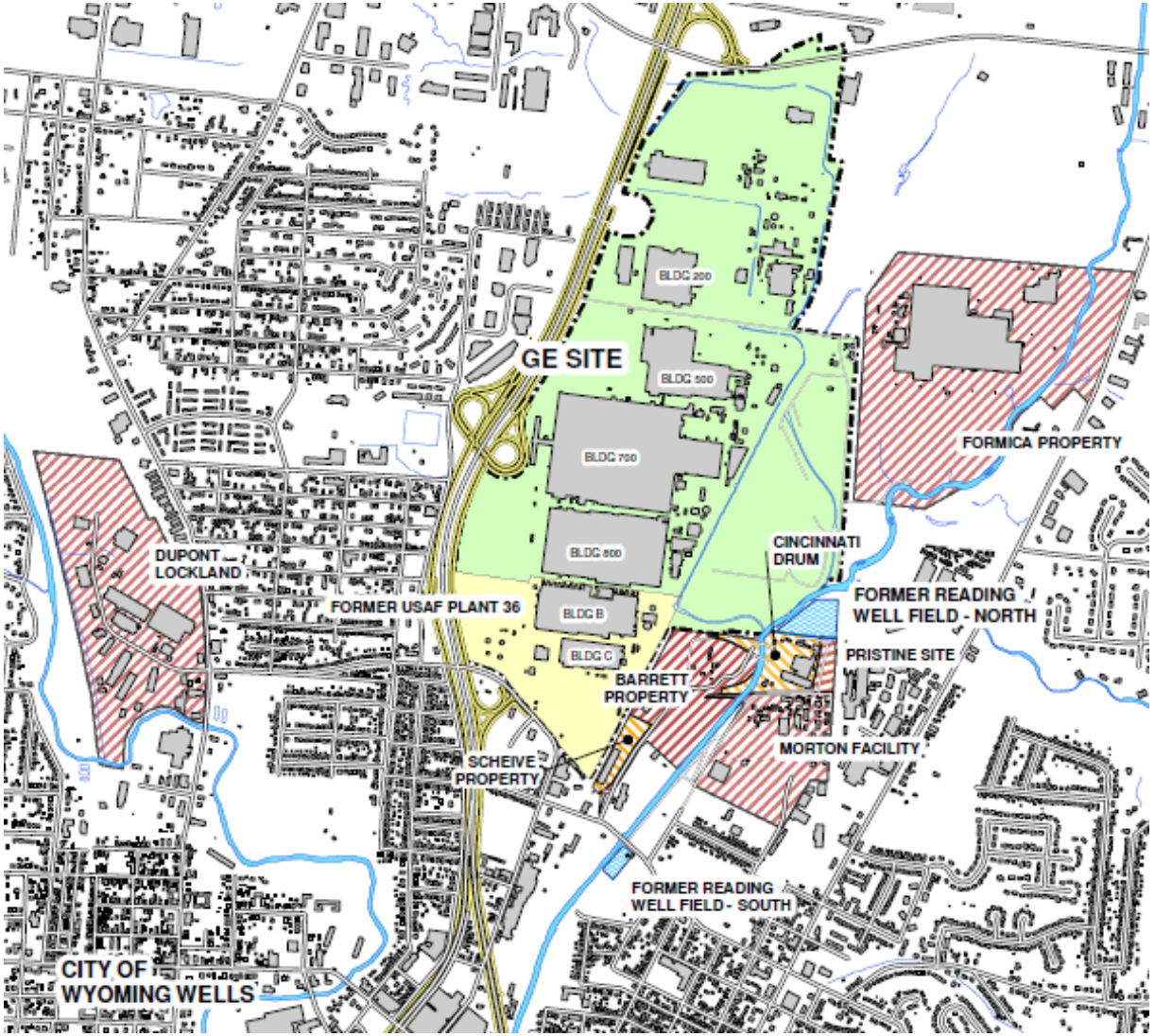
Evendale Remediation Project Overview – RCRA CAP History, Status and Milestones

RCRA CAP Requirement	Status / Plans
RFA	Completed 1989
RCRA Permit	October 1990
RFI	Completed 1995
IRMs (SVE, P&T, Bioventing)	Completed 1992 - 2003
Risk Assessment (HH & Eco)	Approved 1996 - 1998
EI CA725 (HH)	Approved 1999
Off-Site & Source Area Investigations	2005 - 2010
IRM (Hydraulic Control)	July 2011 - present
Vapor Pathway Assessment	Coordinate with EPA in 2013
EI CA750 (GW) Update	Planned: Q4 - 2013
CMS Work Plan Submittal	Planned: Q4 - 2013
CMS Completion	Planned: 2014-2015
CMI Implementation	Planned: Begin 2015

Summary of Technical Understandings

Evendale Remediation Project Overview

The site is surrounded by numerous known and suspected sources of CVOCs to groundwater.



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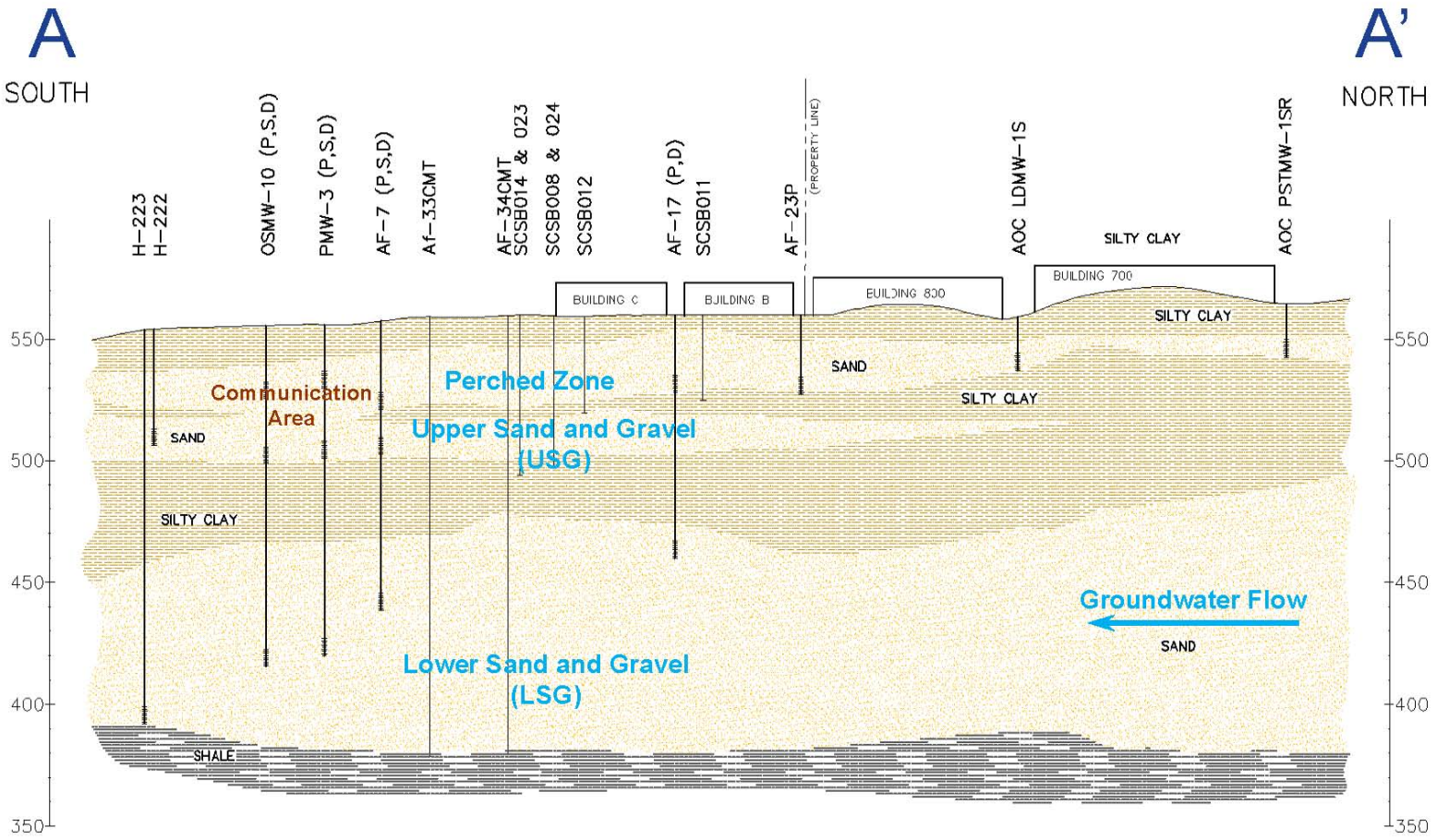
Evendale Remediation Project Overview

Groundwater data are shown along cross section A - A’

Saturated soil data are shown along cross section B - B’

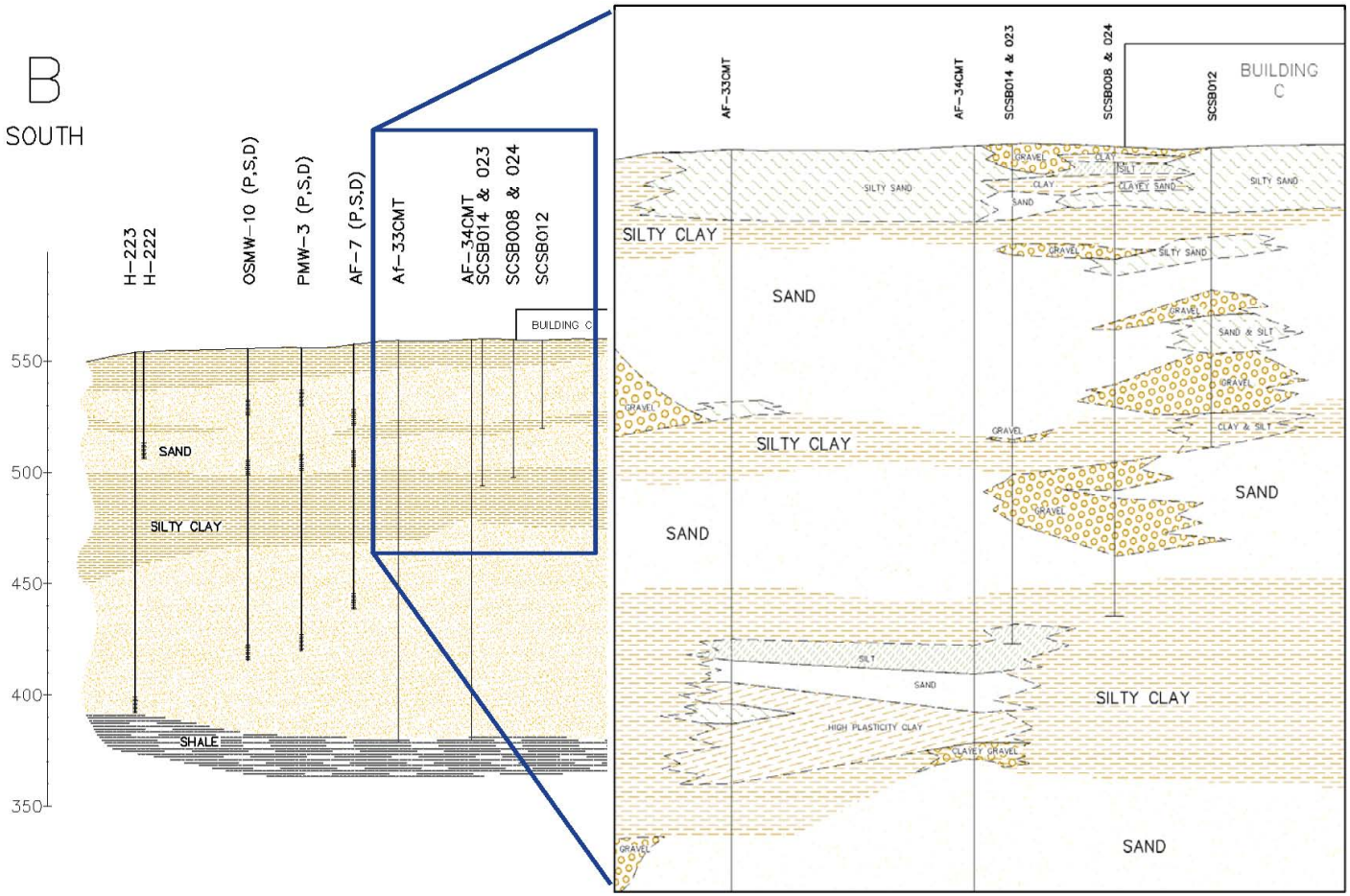
Evendale Remediation Project Overview

Above bedrock, there is one aquifer with 3 major water-yielding zones. These zones are separated by leaky-confining layers. Water and VOCs can move down through these layers.



Evendale Remediation Project Overview

At the large scale, there appear to be relatively higher- and lower-permeability layers of varying thickness. However, at the small scale, the structure and permeability of the layers are shown to be highly variable.



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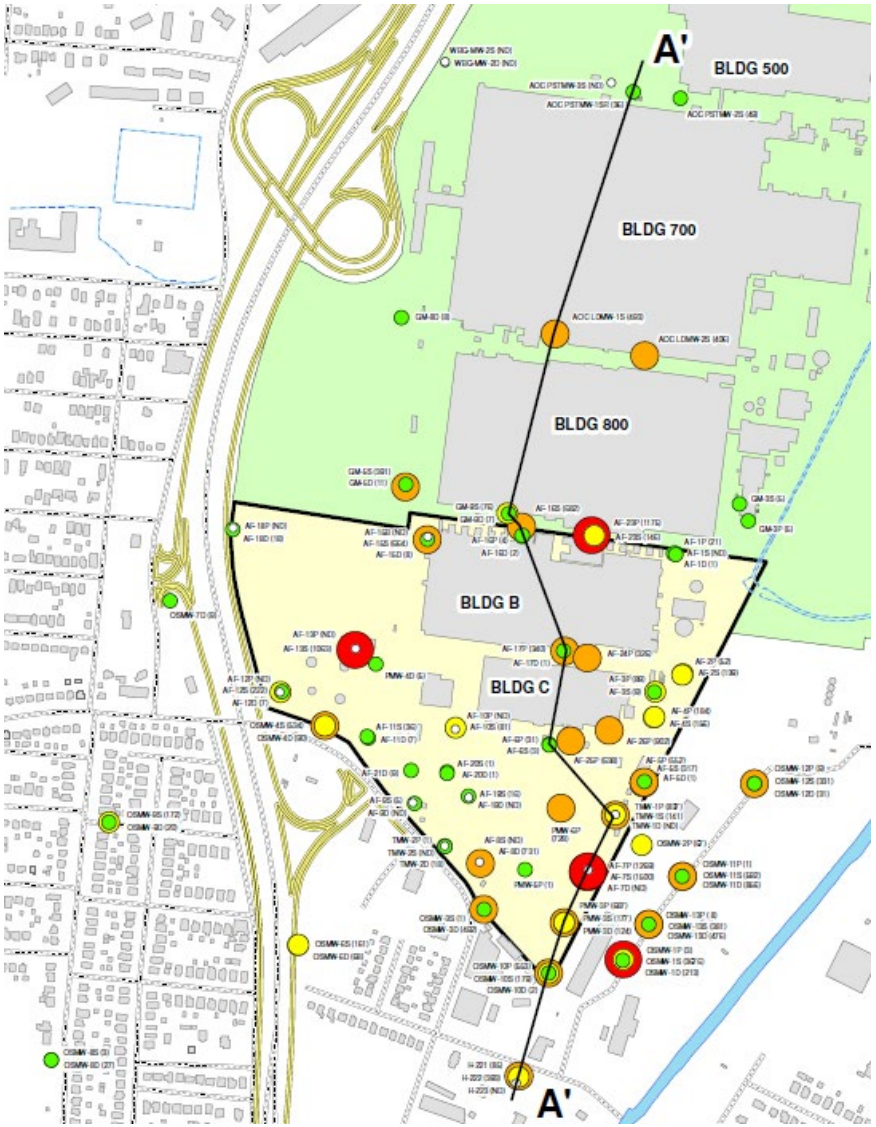
Evendale Remediation Project Overview



LEGEND

Sum of CVOCs Concentrations in Groundwater (µg/l)

Selected Wells – May 2011

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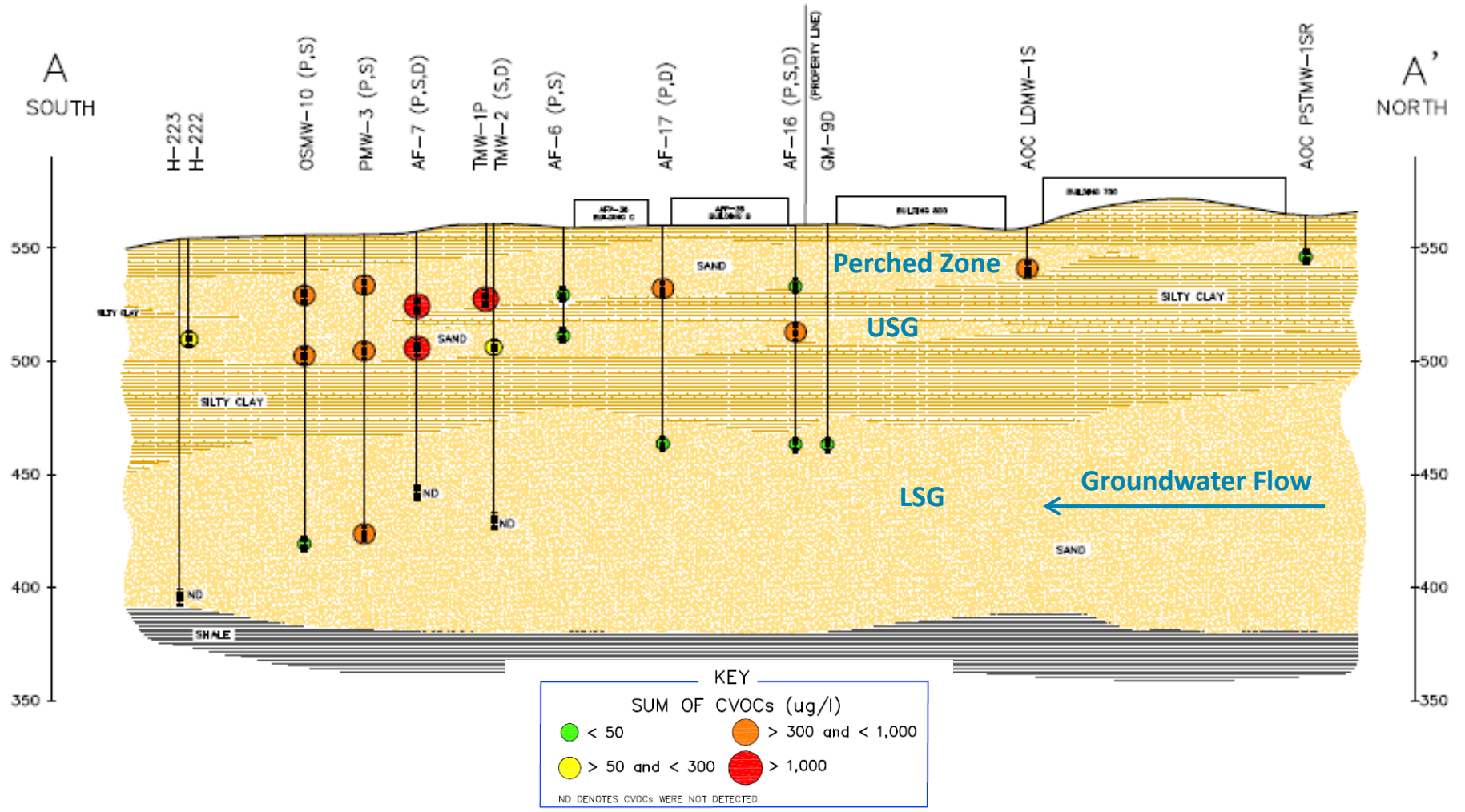
Elevated VOCs in groundwater exist in all three zones.



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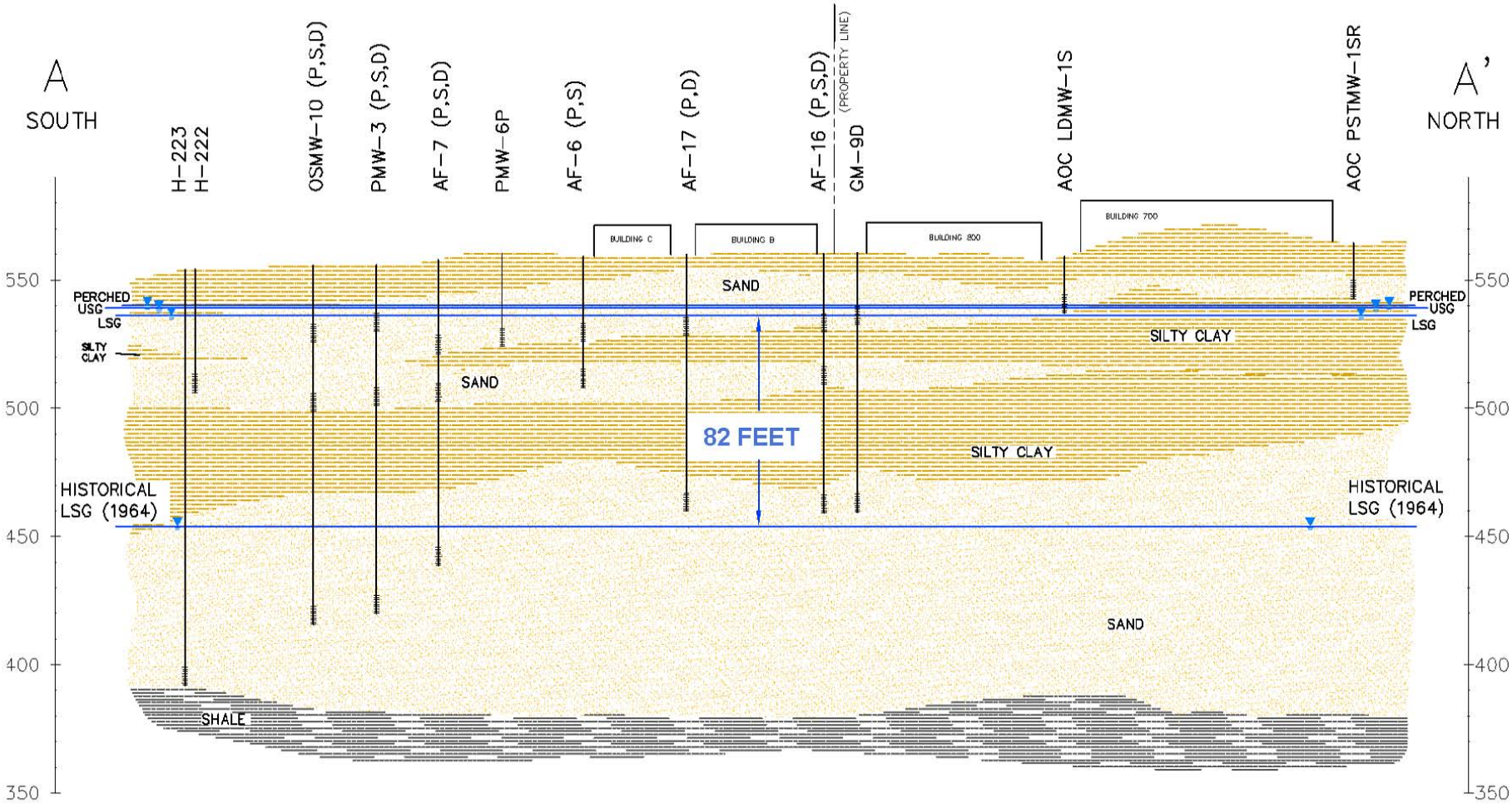
Water levels under AFP 36 were decreased to far below the lower "confining layer" from the 1940s – 1970s.



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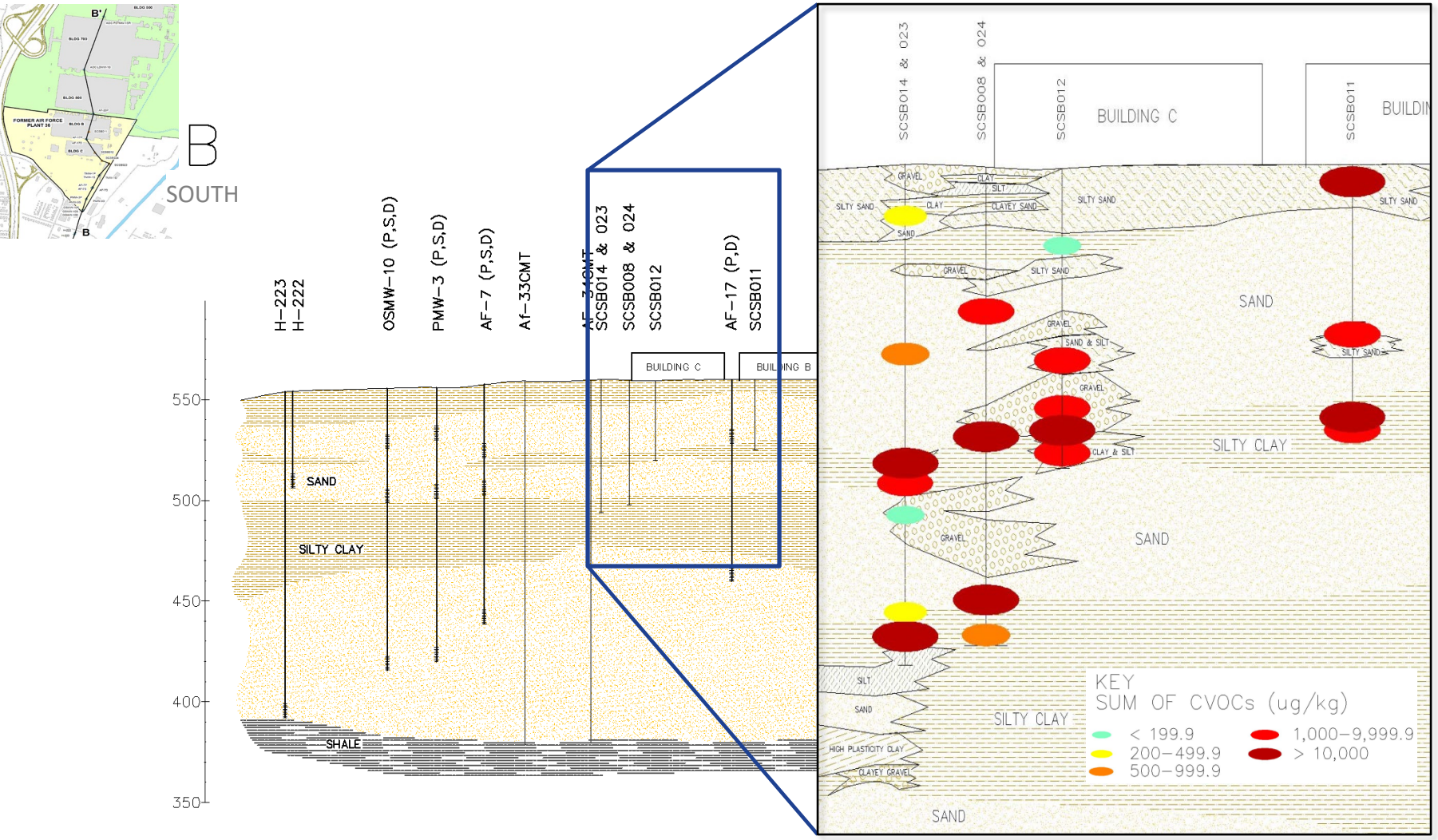
Evendale Remediation Project Overview

VOCs were detected in saturated soil at numerous locations and depths.



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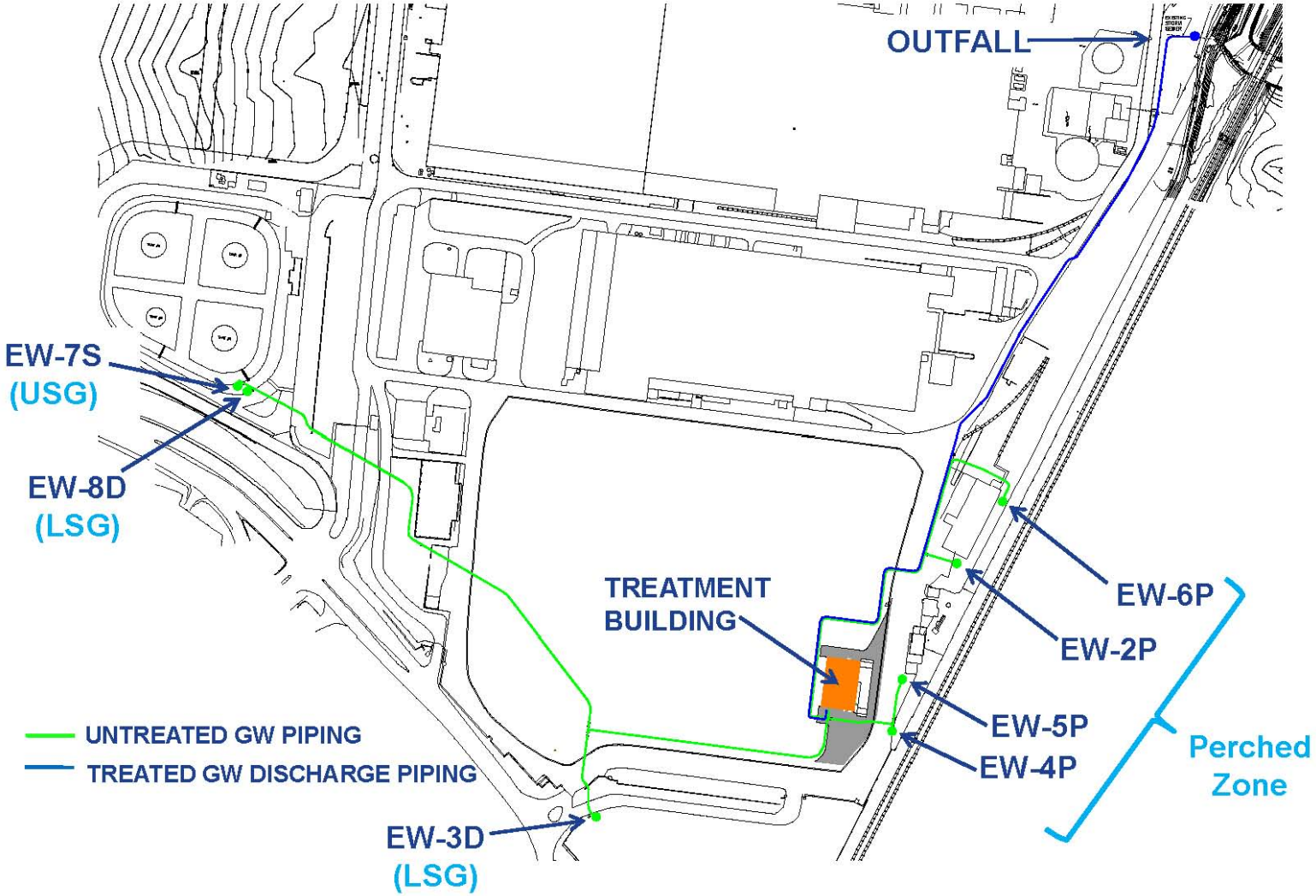
IRM Status

Evendale Remediation Project Overview

General IRM Layout



IRM Update – Extraction System Summary

Evendale, Ohio Site

Pumping Timeline

- Perched Extraction Wells – Started July 11, 2011
  - 35 gpm/well → 30 to 60 gpm/well → currently 35 to 50 gpm/well
- USG Pumping (EW-7S) – August 15 – September 16, 2011
  - 35 gpm → 50 gpm → 45 gpm (beginning on 1/8/2013)
  - (shut down due to biofouling in Dec. 2011-Redeveloped, back online 1/6/2012)
- LSG Extraction Wells (3D, 8D) – September 22, 2011
  - 35 gpm/well → 50 gpm/well

Summary

- Current System Pumping Rate = 325 gpm
- Total Volume of Groundwater Removed = 270 million gallons
- Treatment system in compliance with all discharge parameters
- ~92% operational time through end of February 2013

IRM Update – Statistical Analysis - Summary

Evendale, Ohio Site

- Vertical Cross-Contamination – Hydraulic Data
  - **No Increased Pumping Risk** (closely monitor AF-19S/D, OSMW-10S/D, and PMW-3S/D nested series)
- Vertical Cross-Contamination – Chemical Data
  - **Slight Increased Pumping Risk** in LSG (closely monitor AF-19S/D, OSMW-10S/D, and PMW-3S/D nested series)
- Equilibrium Conditions – Hydraulic Data
  - Perched, USG and LSG – Equilibrium maintained – **Continue Progress Monitoring**
- Extraction Well Influent – Chemical Data
  - Stable/Decreasing Influent Concentrations – **Continue Pumping** (closely monitor in 2013 to evaluate decreasing pumping rates)
- Potential Off-Site Sources – Chemical Data
  - **No Exceedances – Continue Pumping (closely monitoring PMW-3S/D, and off-site wells along Cavett Avenue)**

Estimated Capture Zone - Perched
November 7, 2012

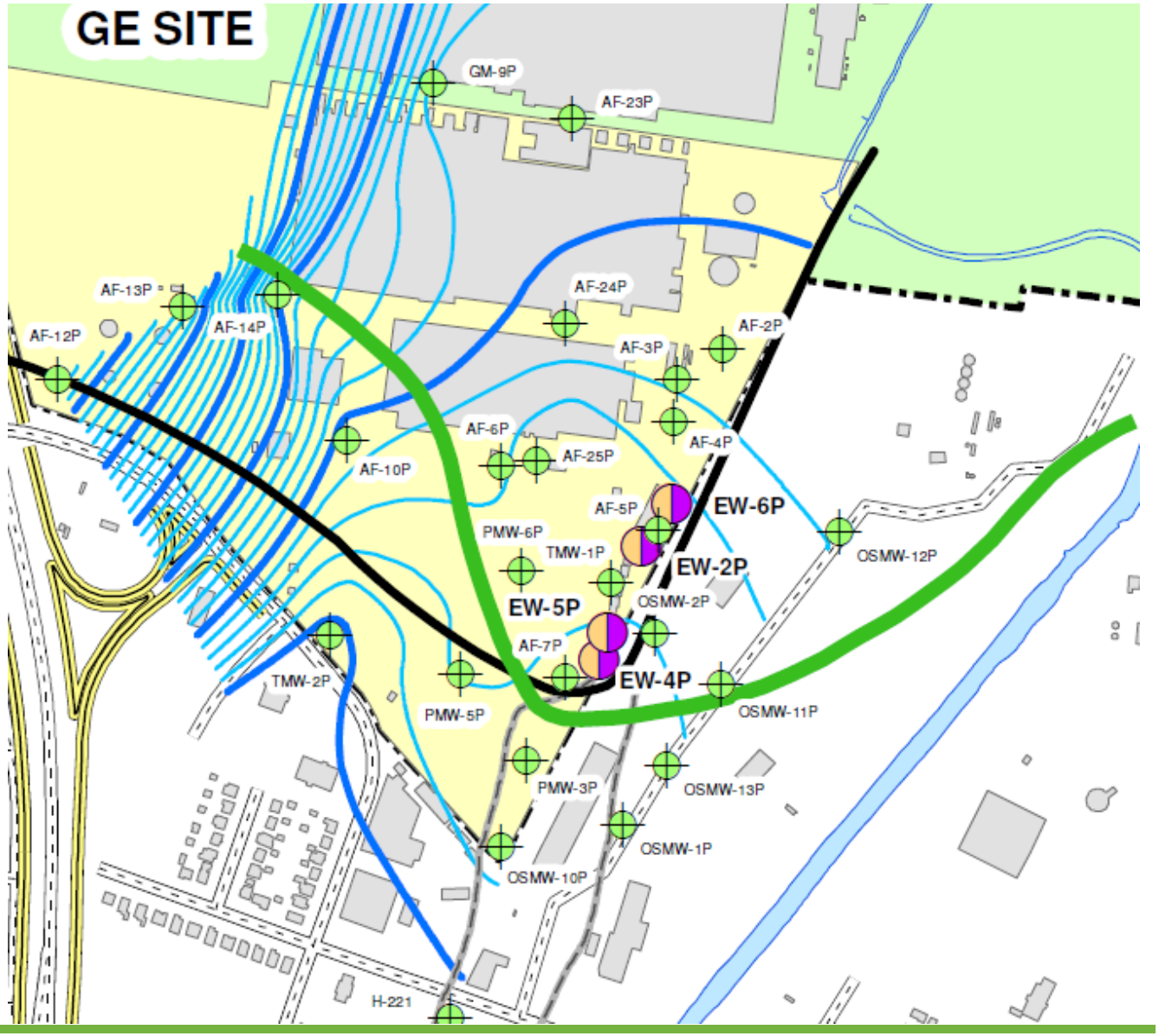
Perched Zone

Design Capture Zone (320 gpm)

Apparent Capture Zone (205 gpm) 11/7/2012

Capture may extend into the USG due to hydraulic gradient reversal in vicinity of Perched extraction wells

Note: IRM design focused on capture *within* the facility boundary



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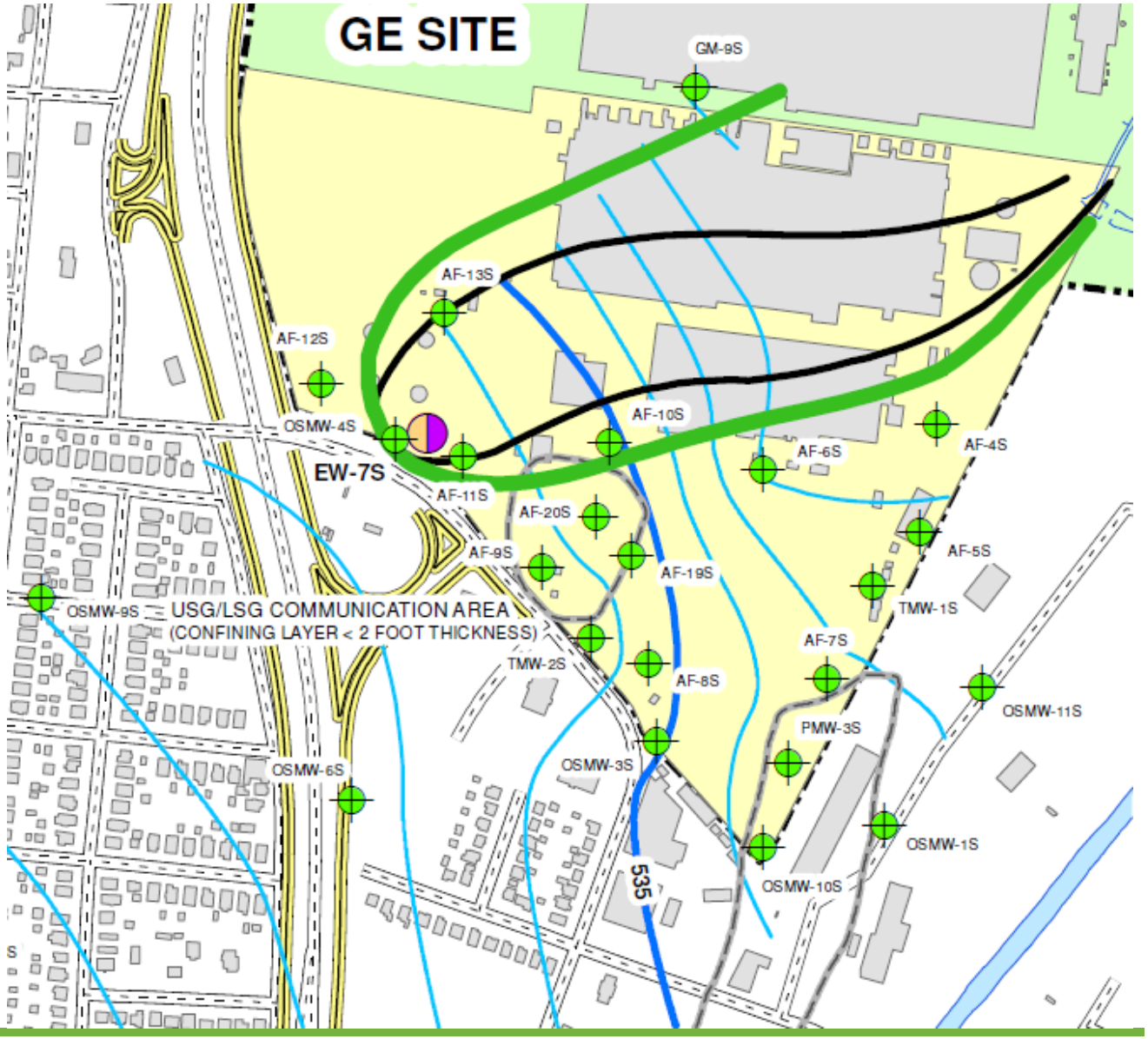
Estimated Capture Zone - USG
November 7, 2012

USG Zone

Design Capture Zone (80 gpm)

Apparent Capture Zone (50 gpm) 11/7/2012

Upward vertical gradient between LSG and USG in vicinity of USG extraction well EW-7S



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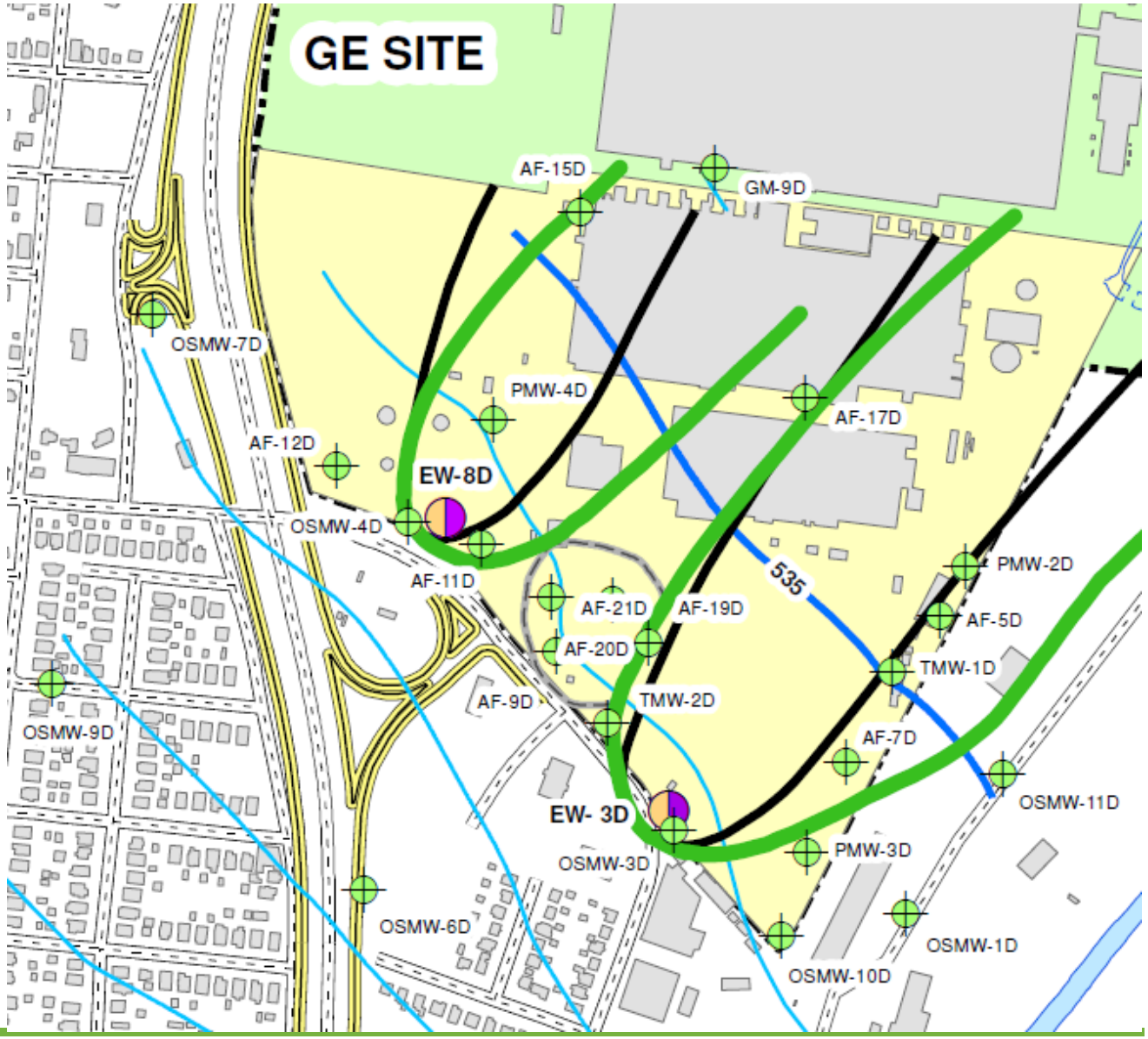
Estimated Capture Zone - LSG
November 7, 2012

LSG Zone

Design Capture Zone (160 gpm)

Apparent Capture Zone (100 gpm) 11/7/2012



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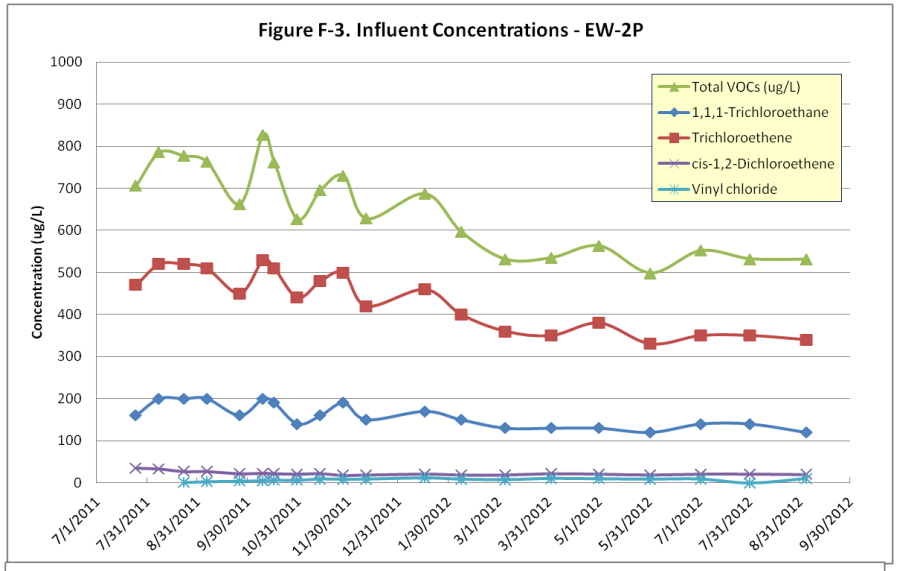
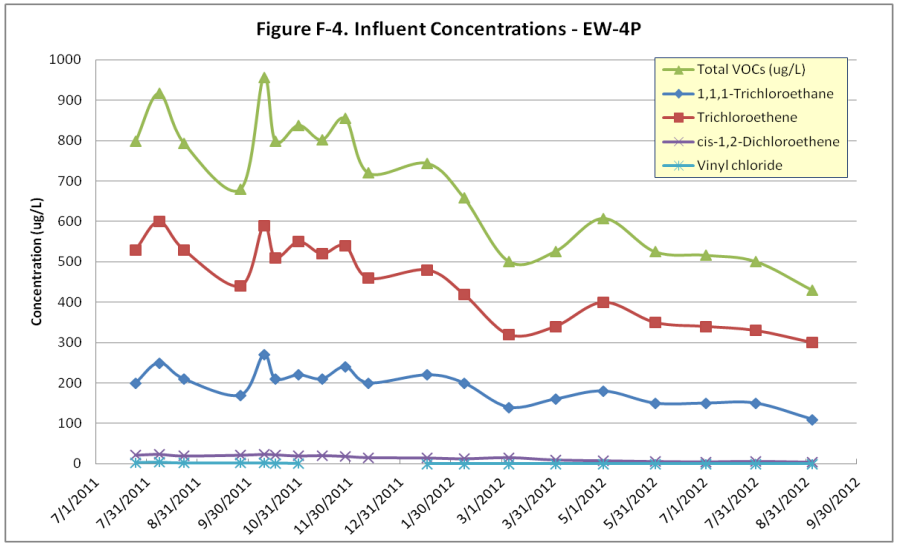
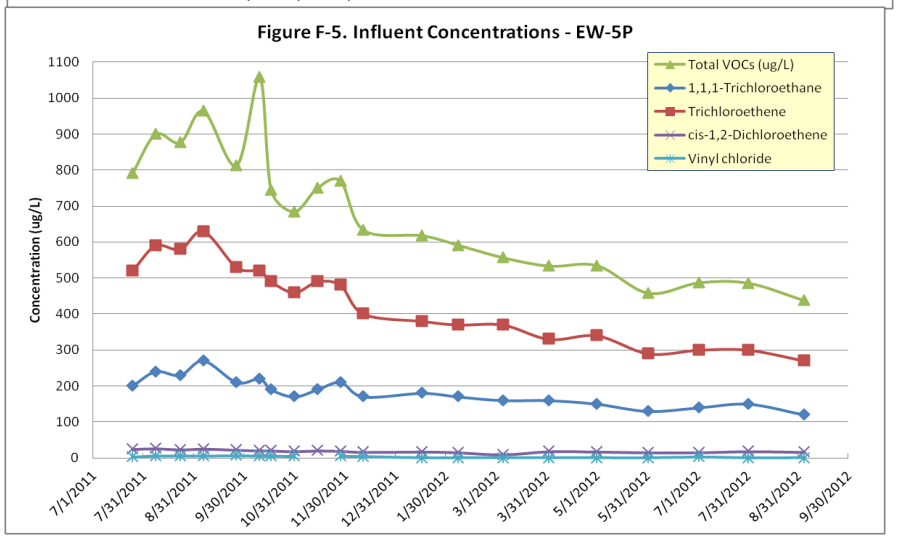
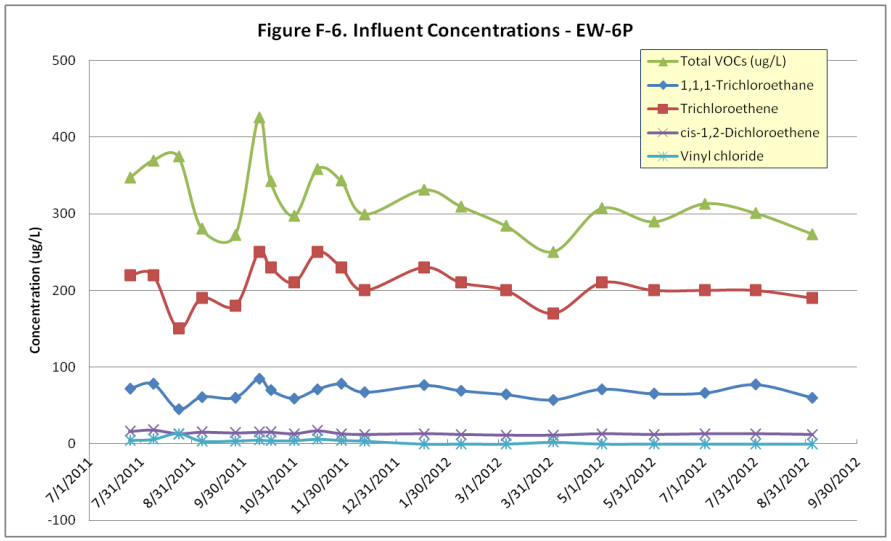
IRM Update – Groundwater Quality – Perched Extraction Wells



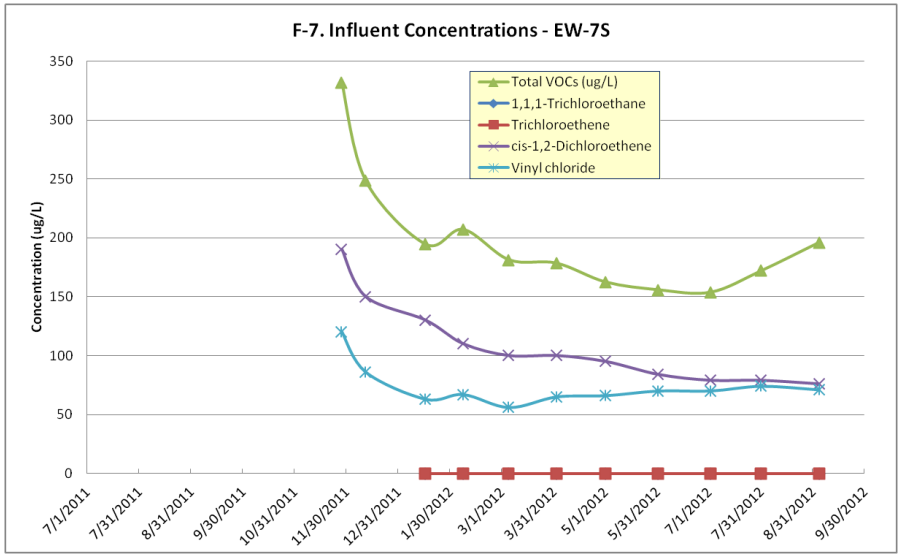


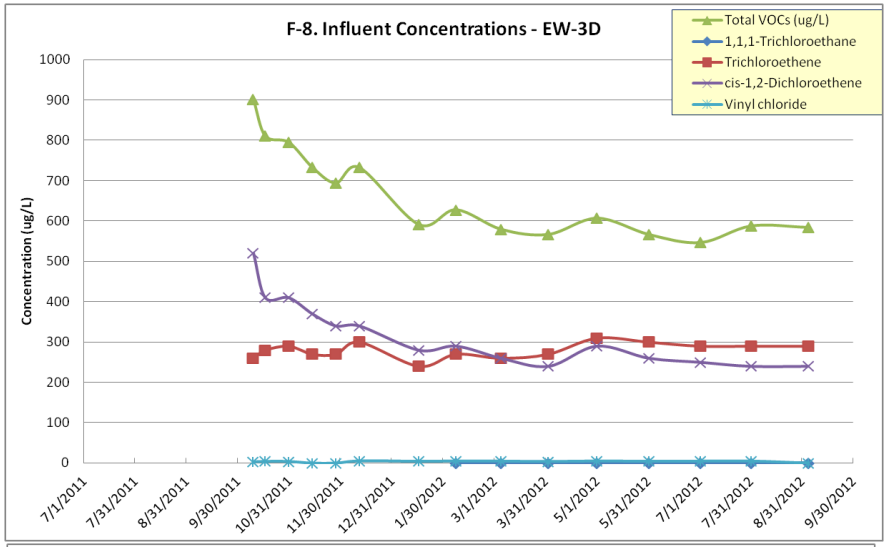


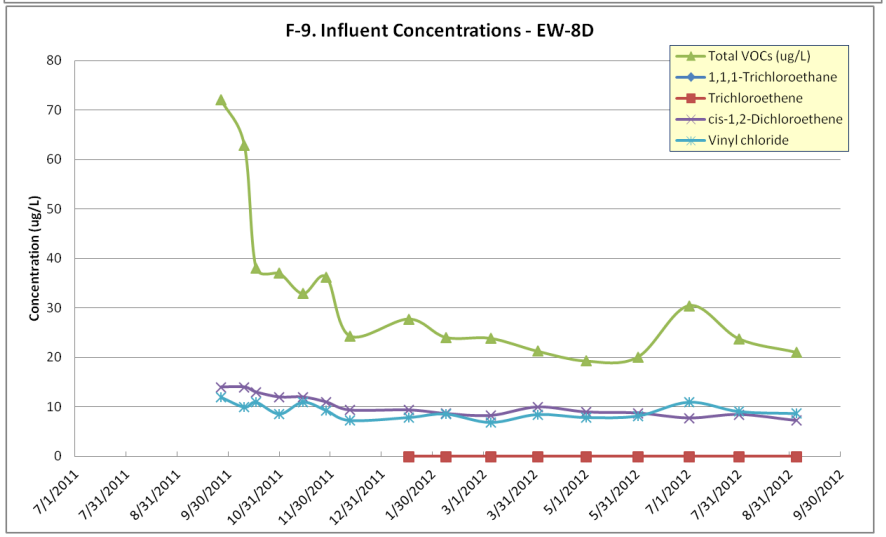


- Decreasing concentrations in extraction well influent of Perched

IRM Update – Groundwater Quality – USG/LSG Extraction Wells

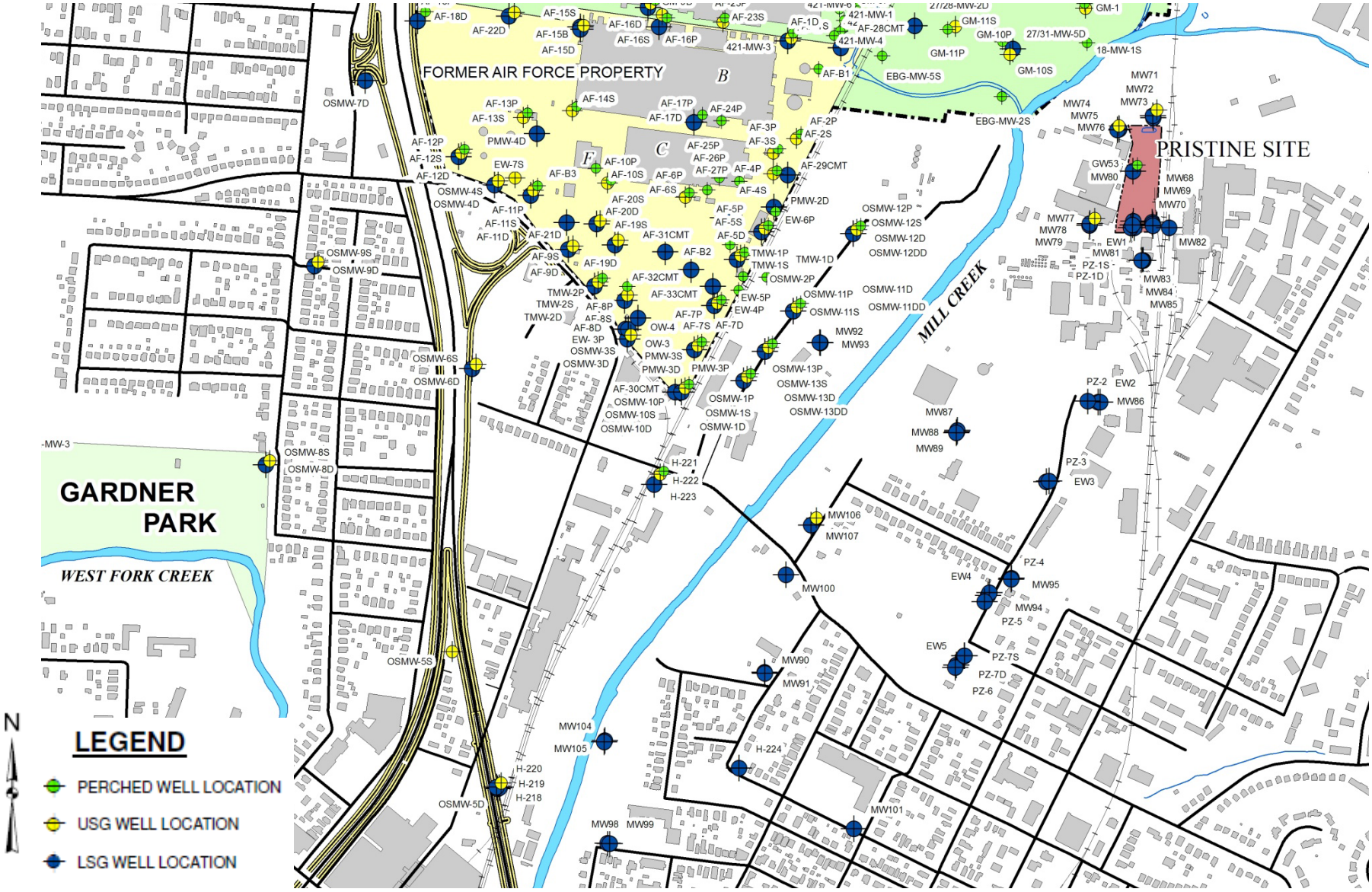




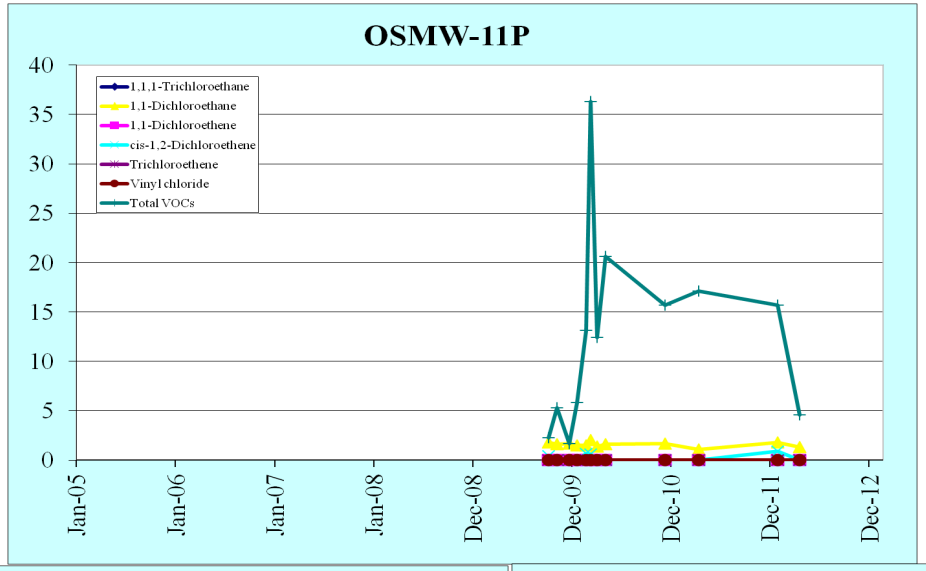


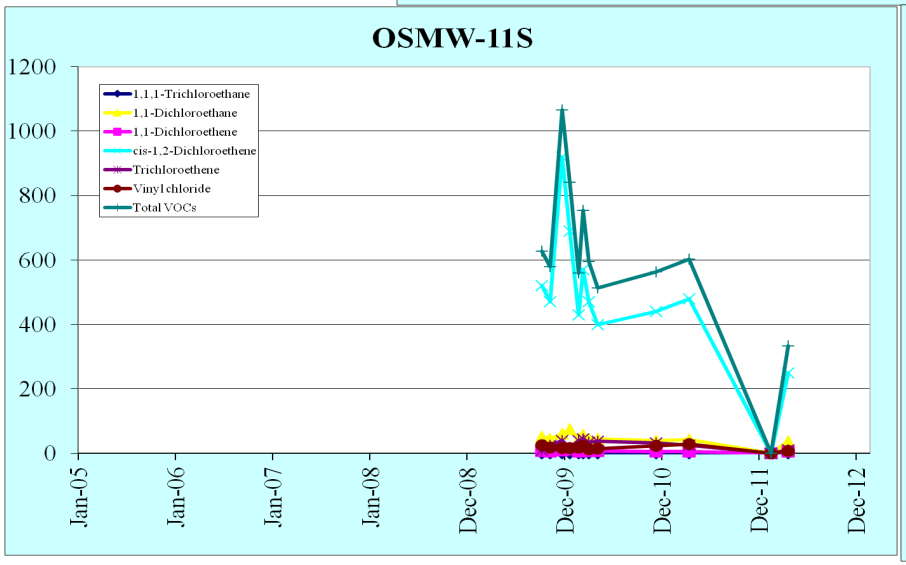
- Decreasing concentrations in extraction well influent of USG and LSG

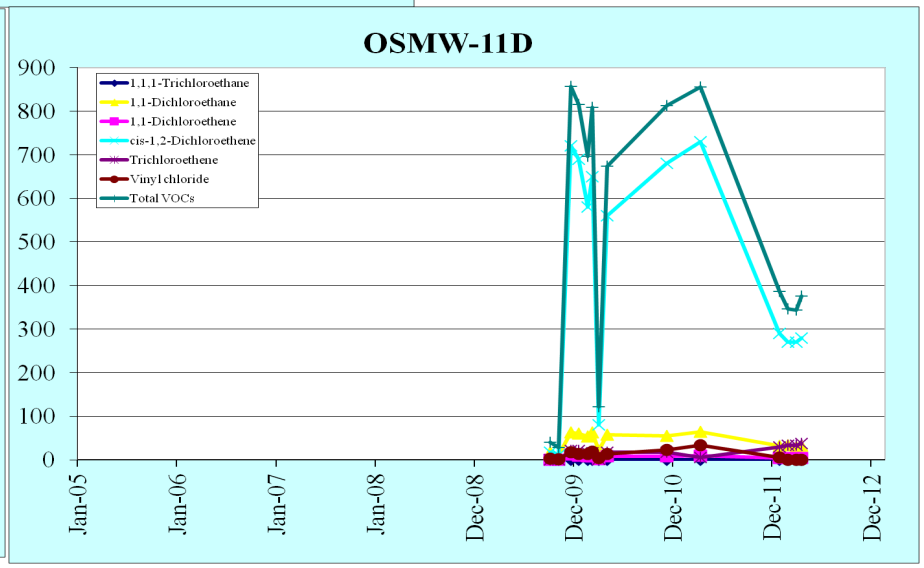
Site Location Map – Off-Site Monitoring Locations



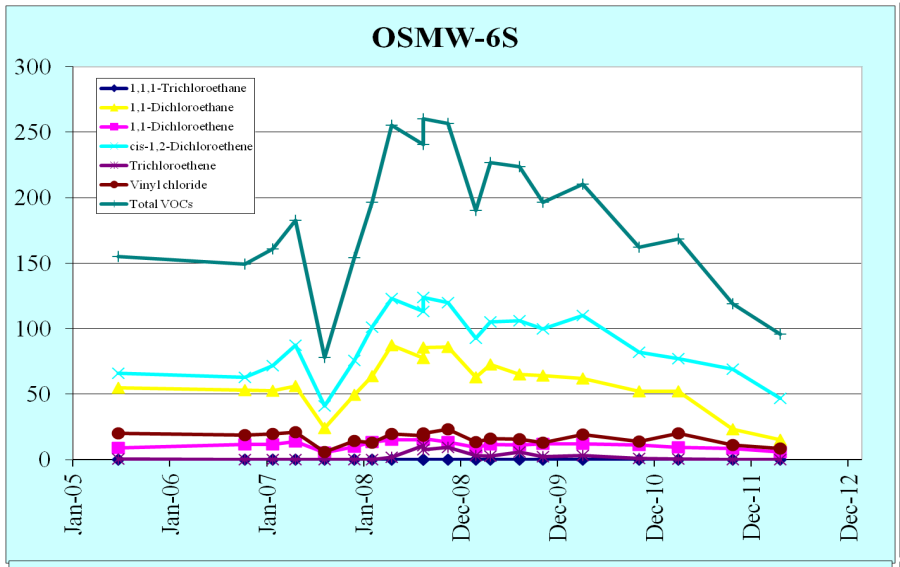
Off-Site Groundwater Quality Monitoring – Perched/USG/LSG East

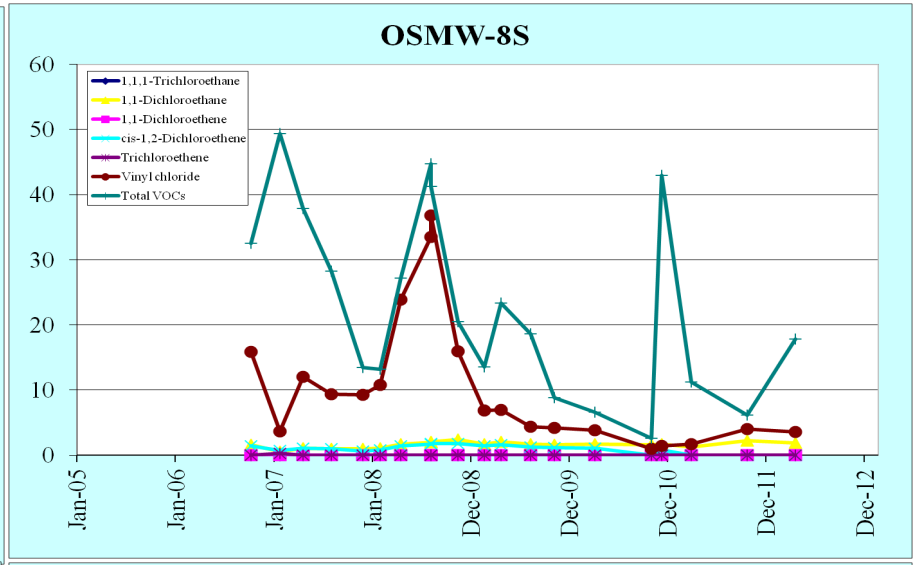


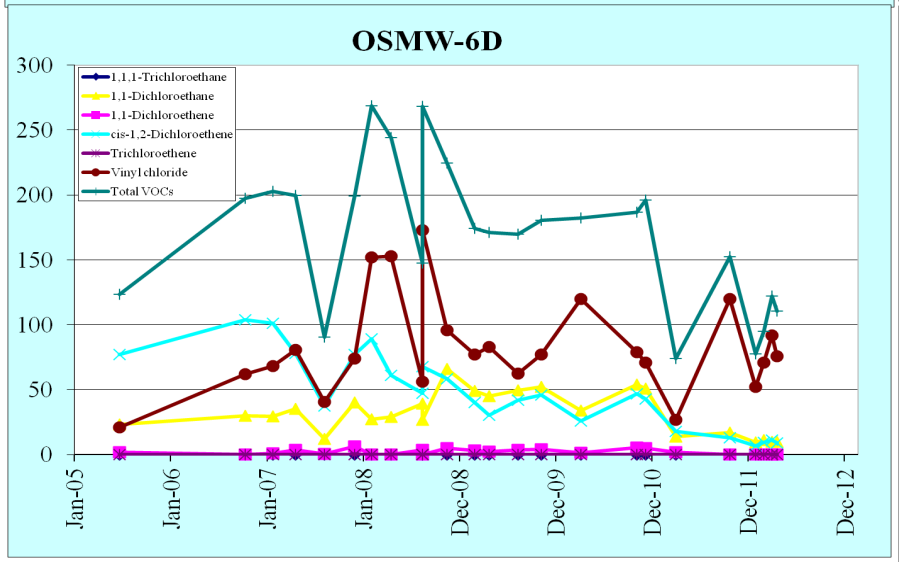


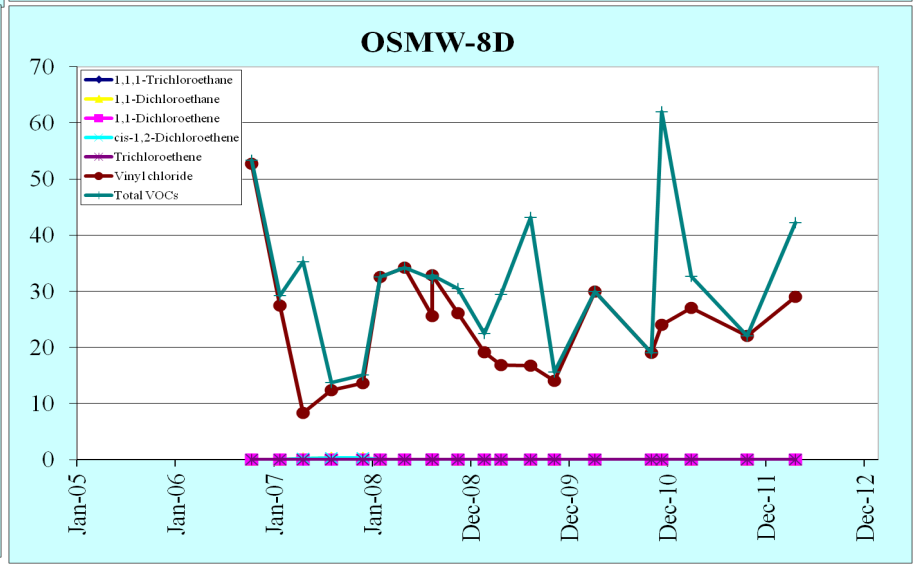


Off-Site Groundwater Quality Monitoring – USG/LSG South

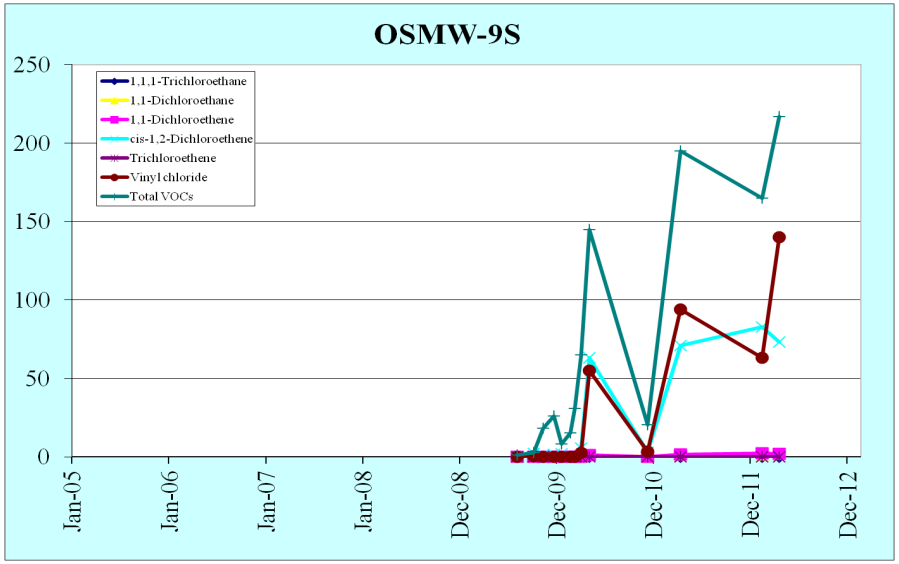


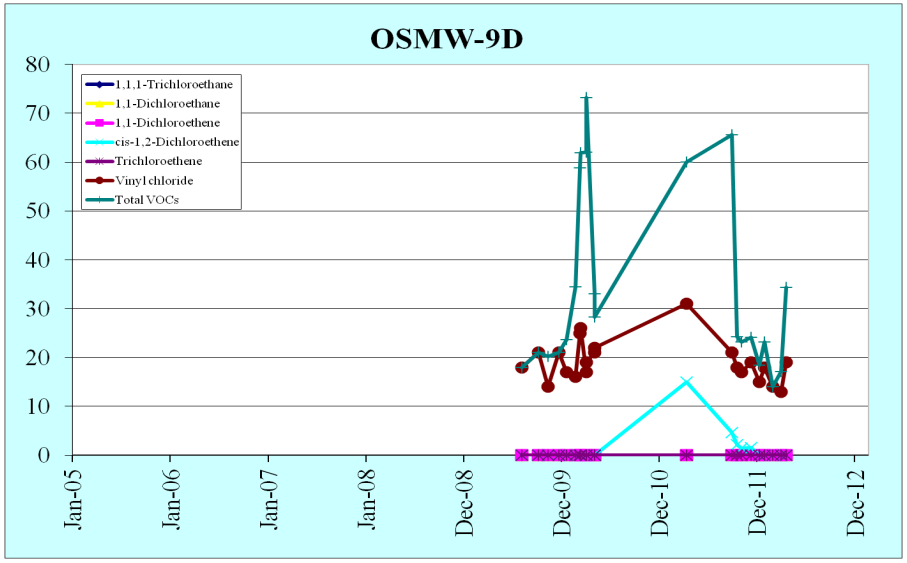


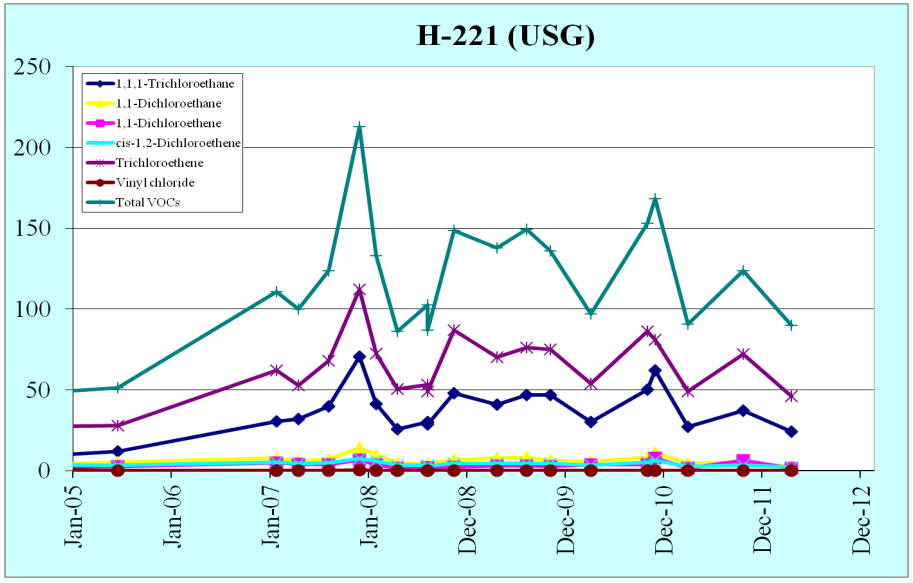




Off-Site Groundwater Quality Monitoring – USG/LSG South







Evendale Remediation Project Overview – 2013 Schedule

ID	Task Name
1	**Monthly USEPA Progress Reports**
41	**Quarterly USEPA Progress Reports**
57	**USEPA Meeting (Timeframe TBD)**
58	**Semiannual USAF Coordination Meeting**
62	**Corrective Measures Study Work Plan (CMS WP)**
63	Obtain USEPA Concurrence on Focused CMS
64	Groundwater Sampling Program Evaluation/Consolidation
65	Prepare Draft MNA Program Approach
66	Prepare and Submit CMS WP to USEPA
67	**IRM Monitoring**
68	Conduct IRM GW Sampling - Quarterly
73	Conduct RCRA Semiannual Sampling
76	Conduct IRM WL Monitoring - Quarterly
81	Conduct MNA GW Sampling
83	Conduct Additional PMW3S/D Sampling
88	Annual Well Inspection
89	Area Wide Annual WL Event
90	Submit GW IRM Quarterly Reports to USEPA
95	**Groundwater Treatment System O&M**
132	**Environmental Indicator (CA750) Evaluation**
133	Update MAROS
134	Prepare and Submit EI to USEPA
135	**Vapor Pathway Assessment**

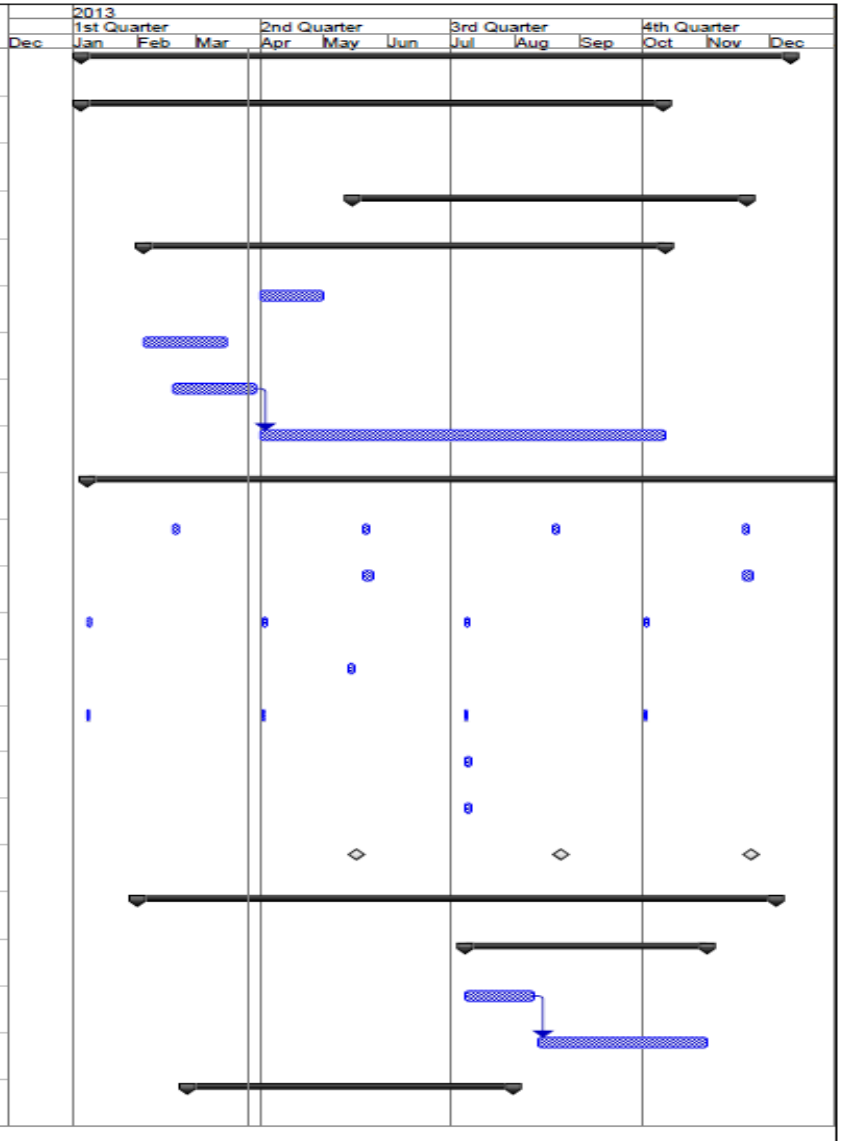


Table of Key Documents

Date	Title	Author (Company)
Nov- 87 (GE)	Hydrogeologic Conditions at the GE Evendale Plant	Geraghty & Miller, Inc.
NOV-88 (GE)	Assessment of Hydrogeologic Conditions at the U.S. Air Force Plant 36, Evendale, OH	Geraghty & Miller, Inc.
Dec-94 rev.Sept95 (GE)	RCRA Facility Investigation	O'Brien & Gere
Jun-96	Ecological Risk Assessment (draft)	O'Brien & Gere
Oct-98	Human Health Risk Assessment for the GEAE Evendale Facility	Chemrisk
Mar-99	Human Health Risk Assess GEAE Evendale Facility APP D	Chemrisk
Feb-08	Source Area Investigation	O'Brien & Gere
Jan-09	Hydraulic Control Interim Remedial Measure Work Plan	O'Brien & Gere
Jun-09	Sampling & Analysis Plan/UFP QAPP	O'Brien & Gere
Dec-13	IRM Performance Monitoring Plan	O'Brien & Gere
Sep-11	Groundwater Flow Model Report	O'Brien & Gere
Feb-12	October 2011 Semiannual Groundwater Sampling Report	O'Brien & Gere
Jan-12	Groundwater IRM Startup Operations Report	O'Brien & Gere
Aug-12	Groundwater IRM Quarterly Groundwater Monitoring Report 2nd Quarter- 2012	O'Brien & Gere